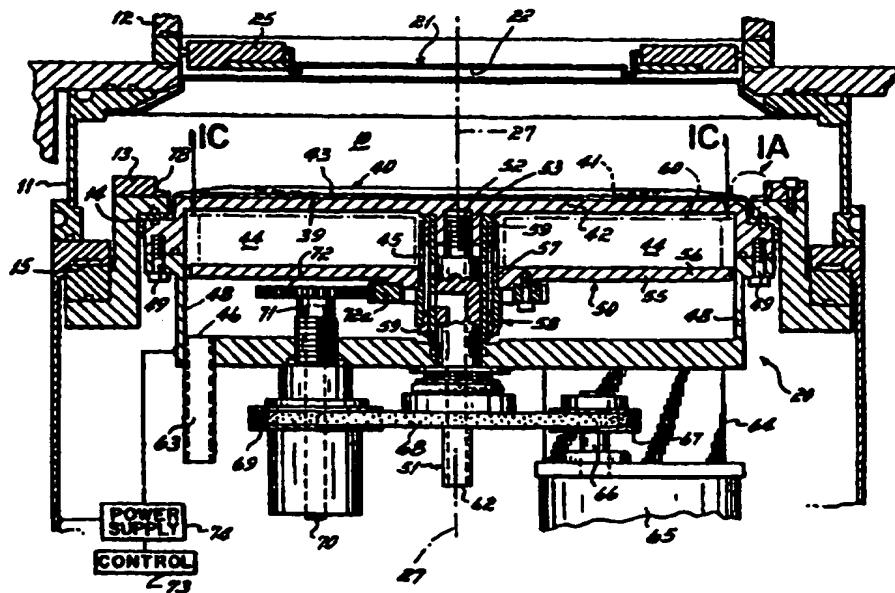




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H01J 37/34		A3	(11) International Publication Number: WO 96/14653 (43) International Publication Date: 17 May 1996 (17.05.96)
(21) International Application Number: PCT/US95/15324		(81) Designated States: AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, LS, MW, SD, SZ, UG).	
(22) International Filing Date: 3 November 1995 (03.11.95)			
(30) Priority Data: 08/334,561 4 November 1994 (04.11.94) US			
(71) Applicant: MATERIALS RESEARCH CORPORATION [US/US]; Route 303, Orangeburg, NY 10962 (US).		Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
(72) Inventors: VANNUTT, Charles, N.; 7 Revere Road, Monroe, NY 10950 (US). DE, Bhola, N.; 23 Massachusetts Avenue, Congers, NY 10920 (US). ISHII, Jonathan; 20 Edward Street, Sparkill, NY 10976 (US).			
(74) Agents: HUMPHREY, Thomas, W. et al.; Wood, Herron & Evans, 2700 Carew Tower, Cincinnati, OH 45202 (US).		(88) Date of publication of the international search report: 29 August 1996 (29.08.96)	

(54) Title: METHOD AND APPARATUS FOR REDUCING ARCING IN PLASMA PROCESSING CHAMBERS



(57) Abstract

Arching in a plasma process is reduced by shaping the target (40) and dark space shield (13) so that their peripheral regions curve away from each other, reducing electric fields and the propensity for arching between the target and dark space shield. Also disclosed is an improved system for detecting arching and presenting data related to detected arcs for analysis; the system generates a graph of the number of arcs, rate of arching, as a function of total power consumed, or alternatively a histogram of bars (120) each indicating the number of arcs having an associated magnitude.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

INTERNATIONAL SEARCH REPORT

Int. Application No
PCT/US 95/15324

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H01J37/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE,A,43 04 581 (LEYBOLD AG) 18 August 1994 see column 2, line 30 - column 4, line 29; figure ---	1
Y	DE,A,42 01 551 (LEYBOLD AG) 29 July 1993 see column 2, line 11 - line 26 see column 3, line 50 - column 4, line 64; figure ---	1
P,A	EP,A,0 625 792 (APPLIED MATERIALS INC) 23 November 1994 see abstract; figures -----	2

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- 'A' document defining the general state of the art which is not considered to be of particular relevance
- 'E' earlier document but published on or after the international filing date
- 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- 'O' document referring to an oral disclosure, use, exhibition or other means
- 'P' document published prior to the international filing date but later than the priority date claimed

- 'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- 'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- 'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- '&' document member of the same patent family

1

Date of the actual completion of the international search	Date of mailing of the international search report
20 March 1996	19.07.96

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl.
Fax (+ 31-70) 340-3016

Authorized officer

SCHAUB G.G.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/15324

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. CLAIMS 1-6 TARGET EDGES AND/OR DARK SPACE SHIELD SHAPED TO MINIMIZE ARCING.
2. CLAIMS 7-12 METHOD OF DETECTING ARCING AND VISUALIZE THE NUMBER OF ARCS VS. TIME OR THE MAGNITUDE OF ARCS VS. TIME.

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-6

Remark on Protest

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No

PCT/US 95/15324

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
DE-A-4304581	18-08-94	EP-A-	0612097	24-08-94
		JP-A-	6240454	30-08-94
DE-A-4201551	29-07-93	US-A-	5334298	02-08-94
EP-A-0625792	23-11-94	JP-A-	7090568	04-04-95

THIS PAGE BLANK (USPTO)